Dr. Murthy S. Gudipati

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Curriculum Vitae

Employment & Education

4/2021 -	:	Senior Research Scientist (SRS), Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA.
2007 – 4/2021:		Principal Scientist, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA.
2001 – 2020:		Adjunct Associate Research Scientist (2010-2020), Institute for Physical Sciences & Technology (IPST), University of Maryland at College Park, MD.
2001 – 2006:		SRI International, Molecular Physics Laboratory, Menlo Park, CA (2001-2002) and NASA Ames Research Center, Moffett Field, CA (2002 – 2006).
1998 – 2001:		Privatdozent der Universität zu Köln; Visiting Scientist: Free University Berlin and NASA Ames Research Center; Professorship Interviews as one of the final 3 candidates at the Heinrich-Heine-Universität Düsseldorf and Technische Universität Ilmenau (Germany).
Nov. 1998:		Habilitation (similar to tenure) in Physical Chemistry – University of Cologne, Germany.
1995 – 1998:		German Science Foundation "Habilitation Fellow".
1990 – 1994:		Research Associate – Institute of Physical Chemistry, University of Cologne, Germany.
1986 – 1989:		Post-Doctoral Affiliation – University of Texas at Austin.
1981 – 1986:		Ph.D. (Chemistry, 1987) – Indian Institute of Science, Bangalore, India.

Visiting Positions

2022 -	Adjunct and Visiting Faculty, Indian Institute of Science, Bengaluru, India.
2021 -	Visiting professor at the NISER, Bhubaneswar
2000	NASA Ames Research Center, California, USA.
1998	Institute of Experimental Physics, Free University Berlin, Germany.
1995	Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin, Germany.

Services

- ❖ Past-Chair (current), Chair (2021-23), Vice-Chair (2019-21) Laboratory Astrophysics Division (LAD) of the American Astronomical Society (AAS).
- ❖ Chair (since 2020) Project Advisory Board, Europlanet 2024 Research Infrastructure.
- ❖ Editor-in-Chief: Earth Moon and Planets (Springer) January 2009 – March 2020.
- ❖ Member of the Working Group for Laboratory Astrophysics (WGLA) of American Astronomical Society (AAS) 2009 - 2012.
- ❖ International Steering Committee Member of the Gordon Research Conferences on "Physics and Chemistry of Matrix-Isolated Species" 2003 – 2011

- ❖ Member of the International Organizing Committee: International Conferences on Low Temperature Chemistry (ICLTC) 2003 – 2011
- ❖ Founding Member, Member Board of Directors, and present Co-Chair "Indian Institute of Science Alumni Association of North America" 2007 – Present

Awards

2014	Mariner Bonus Award
2002	NASA Group Achievement Award
1995	German Science Foundation Habilitation Fellowship
1987	Indian Institute of Science Best Thesis Award (Guha Medal)

Memberships

American Astronomical Society; American Geophysical Union; American Chemical Society; Deutsche Bunsen-Gesellschaft für Physikalische Chemie (former member).

Teaching Interests: Astrochemistry, Astrobiology, Photochemistry, Radiation Chemistry, Planetary Sciences, Space Instrumentation, Astrophysics, and Origin of Life.

Advisor Role: Directed research of several Ph.D. and undergraduate students during the tenure in Germany and continued at JPL as a Co-advisor within the USA and from abroad through national and international collaborations, in addition to a number of postdoctoral coworkers at JPL

Community Services:

Within JPL:

- Proposal development and storyboarding for NASA Innovative and Advanced Concepts (NIAC) program, where futuristic and high-impact mission concepts are matured from back-of-the envelop concepts to mature mission concepts.
- Tiger-Team member for internal process improvements such as the procurement process.
- Help scientists and engineers with discussions as a subject-matter expertise.

Beyond JPL:

- As the Chair of the Laboratory Astrophysics Division (LAD) of the American Astronomical Society (AAS), I have been working to increase collaborations between LAD and other Divisions of AAS such as the Division of Planetary Sciences (DPS).
- I give seminars at Schools as well as at Science Museums across the world to inspire young children, teachers, as well as parents. Over the social media and in-person, I mentor and motivate students across the world, in particular from India.
- Founding member and member of the board of directors of the Indian Institute of Science Alumni Association of North America (IIScAANA) since 2004.

Research Summary: Currently my research focus is to understand evolution of ice and organic (and mineral) matter under radiation environments such as on Europa's surface. Another research focus is to understand cometary nucleus from its origin in prestellar interstellar ice grains to its evolution through Kuiper Belt Objects (KBOs), Jupiter family comets (JFCs), to potential late heavy bombardment by comets and asteroids on early Earth delivering water and organics and triggering origin of life. At the periphery, my interests extend to understanding chemical processes that occur in Earth's ice environment (clouds and surface). My space mission interests are particularly focused on in-situ missions to Moon, Mars, Outer Solar System, and small bodies. I am a PI on several NASA funded projects.

I am actively involved in Europa Clipper Mission as a Co-I, Composition Working Group Co-Chair (2017-2020), and Investigation Scientist. Most recently I was involved in Rosetta mission to comet 67P/Churyumov- Gerasimenko. I have been working on putting a cryogenic comet sample return

mission concept to bring deeper parts of a comet's nucleus, which could hold the secrets of our early solar system. In-situ instrumentation for solar system missions is another area of work that I enjoy, maturing the technology readiness level (TRL) of laboratory instrumentation to space instrumentation.

Most recently, I and my coworkers have established laboratory simulations of exoplanet (from Earth-like to hot-Jupiter) atmospheric chemistry under simultaneous ultraviolet environment and successfully conducted first simulations up to a temperature of ~1800 K. They have shown that two simple molecules predominant in the stellar environments (H_2 and CO) lead to the formation of a variety of key atmospheric molecules such as CO_2, H_2O, CH_4, and some organic aerosol particles as well.

My overarching research goal is to understand "The Chemical Evolution in the Universe leading to the Origin of Life on Earth" - through laboratory simulations, mission observations and instrumentation. Origin of life through comet impacts, astrobiology, biosignatures, and habitability in the solar systems is another significant interest I pursue.

Some of the recent highlights of the "Ice Spectroscopy Lab – ISL", the "Titan Organic Aerosol and Surface Chemistry – TOAST lab", and the "Exoplanet Atmospheric Simulation Lab", which I founded at JPL and presently lead are as follows:

- Europa's nightside ice glow caused by electron bombardment – compositional analysis tool.
- Thermally augmented photochemistry of alien atmospheres – hot-Jupiter atmospheres.
- Complex organics in the plumes of Enceladus – habitability of Enceladus?
- Damage depths of organics in ice by electrons – implication to Europa;
- MeV electron penetration and damage through Europa ice analogs;
- Very low ionization energy of PAHs in ices;
- Development of unique MALDI-TOFMS-QMS system to detect and analyze biosignatures;
- First MALDI-TOFMS study of radiation chemistry in interstellar and solar system ices;
- Low-altitude longer-wavelength tholin production in Titan's atmosphere.

My present research on physics and chemistry of cryogenic ices builds on the over two decades of earlier research work in the fields of chemical physics / physical chemistry, spectroscopy, and photochemistry of atmospheric and organic molecules in cryogenic solids. Most fascinating and still not well understood is the physics and chemistry of cryogenic ices, with applications ranging from evolution of icy bodies in the solar system, in the interstellar medium, aerosol chemistry in Earth's atmosphere, chemistry of polar ices, origins of life through comet impacts, chemistry of comets, and astrobiology. My ambition is to acquire a deeper understanding of physics and chemistry of ices through laboratory experimental studies, use this knowledge to interpret existing data, and develop next generation instrumentation and mission concepts for orbiter remote sensing, in-situ lander, rover, or human missions.

In our lab we conduct spectroscopy of ices and organics from far infrared (500 μm) to deep UV (0.1 μm) using FTIR spectrometers, tunable IR and UV OPO lasers, lamps, spectrometers, and synchrotron radiation (NIST – SURF-III). Recently our Ice Spectroscopy Lab (ISL) developed instrumentation and unique methods to determine electron penetration and damage depths on Euopra's trailing hemisphere (up to 25 MeV electrons) at JPL and NIST-MIRF to understand how deep organic matter or perhaps Life hides beneath Europa's surface to be protected by harsh radiation bombarding its surface from Jupiter's magnetosphere. My motto is, *"If possible, build the facilities that are required to simulate space conditions in the lab at JPL. If not, find out where they are available and collaborate with those facilities"*

I published over 100 peer-reviewed articles in international journals; wrote several reviews and book chapters and edited a book on "The Science of Solar System Ices". I have organized over 10

workshops and sessions; gave over several tens of invited and over a hundred contributed talks at academic institutions and national/international conferences (not included in this CV); chaired several sessions at national and international conferences and organized several international workshops/conferences. I have extensive academic contacts in three continents (America, Europe, and Asia) uniquely position to develop international collaborations among these three continents.

Research Highlights:

- NASA Press Release "Europa Glows: Radiation Does a Bright Number on Jupiter's Moon" (2020): https://www.nasa.gov/feature/jpl/europa-glows-radiation-does-a-bright-number-on-jupiters-moon
- NASA News Feature: "Cooking up Alien Atmospheres on Earth" (2019): https://exoplanets.nasa.gov/news/1557/cooking-up-alien-atmospheres-on-earth/
- Complex Organics Bubble up from Enceladus (2018): https://www.jpl.nasa.gov/news/news.php?feature=7174
- NASA News Feature: Why Comets Are Like Deep Fried Ice Cream? (2015): http://www.nasa.gov/jpl/rosetta/why-comets-are-like-deep-fried-ice-cream/
- NASA Team Investigates Complex Chemistry at Titan (2013): http://www.nasa.gov/topics/solarsystem/features/titan20130403.html
- Direct probing into chemistry of organics in astrophysical and planetary ices (2012): http://www.nasa.gov/topics/universe/features/universe20120918.html
- Survivability of organics under radiation (2012): http://www.astrobio.net/exclusive/4659/how-deep-must-life-hide-to-be-safe-on-europa
- ScSSI – Science of Solar System Ices – International Workshop (Oxnard, 2008): http://www.lpi.usra.edu/meetings/scssi2008/scssi20083rd.shtml
- Extended Red Emission (2007): http://www.nasa.gov/centers/ames/news/releases/2007/07_17AR.html

Selected Publications:

- *Edited Book: The Science of Solar System Ices (2012);* Murthy S. Gudipati and Julie Castillo Eds., Springer, New York.
- Laboratory predictions for the night-side surface ice glow of Europa; Murthy S. Gudipati, Bryana L. Henderson, and Fred B. Bateman; *Nature Astronomy*, Nov 9, 2020. *NASA Press Release "Europa Glows: Radiation Does a Bright Number on Jupiter's Moon"*
- Influence of C/O Ratio on Hot Jupiter Atmospheric Chemistry; Benjamin Fleury, Murthy S. Gudipati, Bryana L. Henderson, and Mark Swain; *The Astrophysical Journal, 899 (2020) 147*; https://doi.org/10.3847/1538-4357/aba828
- The Influence of Europa's Plumes on its atmosphere and ionosphere; Jiazheng Li, Murthy S. Gudipati, and Yuk L. Yung; *Icarus, 352 (2020) 113999;*
- Europa's surface water ice crystallinity: Discrepancy between observations and thermophysical and particle flux modeling; Jodi R. Berdis, Murthy S. Gudipati, James R. Murphy, and Nancy J. Chanover, *Icarus 341 (2020) 113660*.
- Photochemistry in hot H_2-dominated exoplanet atmospheres; Benjamin Fleury, Murthy S. Gudipati, Bryana L. Henderson, Mark Swain, *The Astrophysical Journal 871(2019)158, 14p; doi: 10.3847/1538-4357/aaf79f NASA News Feature: "Cooking up Alien Atmospheres on Earth".*
- Macromolecular organic compounds from deep hydrothermal sites on Enceladus; Frank Postberg et al., *Nature 558(2018)564–568.*

- Evolution of Titan's high-altitude aerosols under ultraviolet irradiation; Nathalie Carrasco, Sarah Tigrine, Lisseth Gavilan, Laurent Nahon, and Murthy S. Gudipati, *Nature Astronomy 2(2018) 489-494*.
- Photochemical Processes in CO_2/H_2O Ice Mixtures with Trapped Pyrene, a model Polycyclic Aromatic Hydrocarbon; Soumya Radhakrishnan, Murthy S. Gudipati, Wolfram Sander, Antti Lignell, *Astrophysical Journal 864:151- 9pp (2018)*
- Seasonal Exposure of Carbon Dioxide Ice on the Nucleus of Comet 67p/Churyumov-Gerasimenko; G. Filacchione et al. *Science_354 (2016) 1563-1566; doi: 10.1126/science.aag3161*
- Exposed water ice on the nucleus of comet 67P/Churyumov–Gerasimenko; G. Filacchione et al. *Nature 529 (2016) 368–372; doi:10.1038/nature16190*
- 67P/Churyumov-Gerasimenko: The Organic-rich surface of a Kuiper Belt comet as seen by VIRTIS/Rosetta; Rosetta VIRTIS team *Science 347 (28 January 2015) aaa0628*
- Direct Detection of Complex Organic Products in Electron-Irradiated Astrophysical and Cometary Ice Analogs using Two-Step Laser Ablation and Ionization Mass Spectrometry; Bryana L. Henderson and Murthy S. Gudipati *Astrophysical Journal 800 (2015) 66 (17pp);* DOI:10.1088/0004-637X/800/1/66
- Mixing of the Immiscible: Hydrocarbons in Water Ice Near the Ice Crystallization Temperature; Antti Lignell and Murthy S. Gudipati *Journal of Physical Chemistry* (119, 2607, 2015), DOI: 10.1021/jp509513s; *NASA News Feature: NASA News Feature: Why Comets Are Like Deep Fried Ice Cream.*
- Photochemical Activity of Titan's Low-Altitude Condensed Haze; Murthy S. Gudipati, Ronen Jacovi, Isabelle Couturier-Tamburelli, Antti Lignell, Mark Allen *Nature Communications 4 (2013) 1648;* DOI: 10.1038/ncomms2649/ncomms2649; *NASA Press Release "NASA Team Investigates Complex Chemistry at Titan"; Editor's Choice "Simulating Titan's Atmosphere" Science 340 (2013) 250-251.*
- In-situ Probing of Radiation-Induced Processing of Organics in Astrophysical Ice Analogs – Novel Laser Desorption Laser Ionization Time-of-Flight Mass Spectroscopic Studies; Murthy S. Gudipati and Rui Yang *Astrophysical Journal Letters 746 (2012) L24. NASA Press Release "Brewing organics on ice".*
- The Impact of Recent Advances in Laboratory Astrophysics on our Understanding of the Cosmos; D. W. Savin, N. S. Brickhouse, J. J. Cowan, R. P. Drake, S. R. Federman, G. J. Ferland, A. Frank, M. S. Gudipati, W. C. Haxton, E. Herbst, S. Profumo, F. Salama, L. M. Ziurys, and E. G. Zweibel; *Reports on Progress in Physics 75* (2012) 036901 – *Top 10% downloaded article from IOP Publishing in the first quarter of 2012!*
- Survival Depth of Organics in Ices under Low-energy Electron Radiation; Irene Li Barnett, Antti Lignell, and Murthy S. Gudipati; *Astrophys. J. 747 (2012) 13 (11pp) – News Coverage through Astrobiology Magazine and other news agencies throughout the world.*
- Charged Polycyclic Aromatic Hydrocarbon Clusters and the Galactic Extended Red Emission; Young Min Rhee, Timothy J. Lee, Murthy S. Gudipati, Louis J. Allamandola, and Martin Head-Gordon; *Proceedings of the National Academy of Sciences, USA* 104 (2007) 5274. *NASA Press Release: "NASA Finds Evidence for New Molecular Structure in Space"*

Full Bibliography of Publications

(Comment: Before 1992 I have published under the Name: *Murthy, G.S.*)

Books, Book Chapters, & Reviews

1. **[Review]** Cometary Science with the James Webb Space Telescope; Michael S. P. Kelley, Charles E. Woodward, Dennis Bodewits, Tony L. Farnham, Murthy S. Gudipati, David E. Harker, Dean C. Hines, Matthew M. Knight, Ludmilla Kolokolova, Aigen Li, Imke de Pater, Silvia Protopapa, Ray W. Russell, Michael L. Sitko, and Diane H. Wooden. *Publications of the Astronomical Society of the Pacific; 128(2016)018009.*

2. **[Review]** Observing Outer Planet Satellites (Except Titan) with the James Webb Space Telescope: Science Justification and Observational Requirements; Laszlo Keszthelyi1, Will Grundy, John Stansberry, Anand Sivaramakrishnan, Deepashri Thatte, Murthy Gudipati, Constantine Tsang, Alexandra Greenbaum, and Chima McGruder. *Publications of the Astronomical Society of the Pacific; 128(2016)018006.*

3. **[Invited Review]** Laboratory Studies Towards Understanding Comets; Murthy S. Gudipati, Ninette Abou Mrad, Jürgen Blum, Steven B. Charnley, Thierry Chiavassa, Martin A. Cordiner, Grégoire Danger, Fabrice Duvernay, Bastian Gundlach, Paul Hartogh, Ulysse Marboeuf, Olivier Mousis, Irakli Simonia, Tsitsino Simonia, Patrice Theulé, Rui Yang *Space Science Reviews 2015; DOI 10.1007/s11214-015-0192-5*

4. **[Invited Review]** Chemistry, thermodynamics and material processes at low temperatures; Murthy S. Gudipati in **Low Temperatures Materials and Mechanisms; Y. Bar-Cohen (Ed.), CRC Handbook (2015).**

5. **[Invited Review]** The Impact of Recent Advances in Laboratory Astrophysics on our Understanding of the Cosmos; D. W. Savin, N. S. Brickhouse, J. J. Cowan, R. P. Drake, S. R. Federman, G. J. Ferland, A. Frank, M. S. Gudipati, W. C. Haxton, E. Herbst, S. Profumo, F. Salama, L. M. Ziurys, and E. G. Zweibel; *Reports on Progress in Physics 75* (2012)

6. **[Book Chapter]** Amorphous and Crystalline H_2O-Ice; Rachel M. E. Mastrapa, William M. Grundy, and Murthy S. Gudipati; *The Science of Solar System Ices (2012);* Murthy S. Gudipati and Julie Castillo Eds., Springer, New York. pp 371-408

7. **[Book Chapter]** Chemistry in Water Ices: From Fundamentals to Planetary Applications; Murthy S. Gudipati and Paul D. Cooper; *The Science of Solar System Ices (2012* Murthy S. Gudipati and Julie Castillo Eds., Springer, New York. pp 503-526

8. **[Edited Book]** *The Science of Solar System Ices;* Murthy S. Gudipati and Julie Castillo Eds., Springer, New York.
9. **[Book Chapter]** Thermal and Photochemical Transformations of Endoperoxides; Griesbeck, A. G., Gudipati, M. S. in *CRC Handbook of Organic Photochemistry and Photobiology*, William M. Horspool, Francesco Lenci (eds.) CRC Press: Boca Raton, 2003, 108.1-108.15

10. **[Book Chapter]** Near-UV Photolysis of Singlet Oxygen Generated via Energy Transfer from Aromatic Molecules in Rare Gas Matrices; Gudipati, M. S., Wagner, R., Kalb, M., and Klein, A.; In *Peroxide Chemistry "Mechanistic and Preparative Aspects of Oxygen Transfer",* Adam, Waldemar, Ed.*;* Wiley-VCH (2000) 620

Peer Reviewed Journal Articles

1. Phase and morphology of water-ice grains formed in a cryogenic laboratory plasma; André Nicolov, Murthy S. Gudipati, Paul M. Bellan; *The Astrophysical Journal (2024 in print)*
2. Becker, T. M., Zolotov, M. Yu, Gudipati, M. S., Soderblom, J. M., McGrath, M. A., Henderson, B. L., Hedman, M. M., Choukroun, M., Clark, R. N., Chivers, C. J., Wolfenbarger, N. S., Glein, C. R., Castillo-Rogez, J. C., Mousis, O., Scanlan, K. M., Diniega, S., Seelos, F.P., Goode, W., Postberg, F., Grima, C., Hsu, S.-W., Roth, L.,Trumbo, S. K., Miller, K. E., Chan, K., Paranicas, C., Brooks, S. M., Soderlund, K. M.,McKinnon, W. B., Hibbitts, C. A., Smith, H. T., Molyneux, P. M., Gladstone, G. R., Cable, M. L., Ulibarri, Z. E., Teolis, B. D., Horanyi, M., Jia, X., Leonard, E. J., Hand, K.P., Vance, S.D., Howell, S. M., Quick, L. C., Mishra, I., Rymer, A. M., Briois, C., Blaney, D. L., Raut, U., Waite, J. H., Retherford, K. D., Shock, E., Withers, P., Westlake, J. H., Jun, I., Mandt, K. E., Buratti, B. J., Korth, H., Pappalardo, R. T., and the Europa Clipper Composition Working Group. *Space Science Reviews* (*in revision*)
3. Experimental Investigations of Diacetylene Ice Photochemistry in Titan's Atmospheric Conditions; Benjamin Fleury, Murthy S. Gudipati, and Isabelle Couturier-Tamburelli, *Astronomy & Astrophysics 684 (2024) A1*.
4. Planned Geological Investigations of the Europa Clipper Mission; I.J. Daubar, A.G. Hayes, G.C. Collins, K.L. Craft, J.A. Rathbun, J.R. Spencer, D.Y. Wyrick, M.T. Bland, A.G. Davies, C.M. Ernst, S.M. Howell, E.J. Leonard, A.S. McEwen, J.M. Moore, C.B. Phillips, L.M. Prockter, L.C. Quick, J.E.C. Scully, J.M. Soderblom, S.M. Brooks, M. Cable, M.E. Cameron, K. Chan, C.J. Chivers, M. Choukroun, C.J. Cochrane, S. Diniega, A.J. Dombard, C.M. Elder, C. Gerekos, C. Glein, T.K. Greathous, C. Grima, M.S. Gudipati, K.P. Hand, C. Hansen, P. Hayne, M. Hedman, K. Hughson, X. Jia, J. Lawrence, H.M. Meyer, K. Miller, R. Parekh, G.W. Patterson, D.M. Persaud, S. Piqueux, K.D. Retherford, K.M. Scanlan, P. Schenk, B. Schmidt, D. Schroeder, G. Steinbrügge, A. Stern, G. Tobie, P.Withers, D.A. Young, B. Buratti, H. Korth, D. Senske, R. Pappalardo; *Space Science Reviews* 220 (2024) 18.
5. Investigating Europa's Radiation Environment with the Europa Clipper Radiation Monitor; Richard Meitzler, Insoo Jun, Ryan Blasé, Timothy Cassidy, Roger Clark, Corey Cochrane, Sam Fix, Randy Gladstone, John Goldsten, Murthy Gudipati, Kevin Hand, Bryana Henderson, Xianzhe Jia, Joshua Kammer, Peter Kollmann, Alfred McEwen, Heather Meyer, Tom Nordheim, Chris Paranicas, Carol Paty, Kurt Retherford, Elias Roussos, Abigail Rymer, Todd Smith, JoeWestlake, Zach Yokley; *Space Science Reviews 219 (2023) 61*.
6. Investigating Europa's Habitability with the Europa Clipper; Steven D. Vance, Kathleen L. Craft, Everett Shock, Britney E. Schmidt, Jonathan Lunine, Kevin P. Hand, William B. McKinnon, Elizabeth M. Spiers, Chase Chivers, Justin D. Lawrence, Natalie Wolfenbarger, Erin J. Leonard, Kirtland J. Robinson, Marshall J. Styczinski, Divya M. Persaud, Gregor Steinbrügge, Mikhail Y. Zolotov, Lynnae C. Quick, Jennifer E.C. Scully, Tracy M. Becker, Samuel M. Howell, Roger N. Clark, Andrew J. Dombard, Christopher R. Glein, Olivier Mousis, Mark A. Sephton, Julie Castillo-Rogez, Francis Nimmo, Alfred S.McEwen, Murthy S. Gudipati, Insoo Jun, Xianzhe Jia, Frank Postberg, Krista M. Soderlund, Catherine M. Elder; *Space Science Reviews 219 (2023) 81.*
7. Volatiles in the H_2O and CO_2 ices of comet 67P/Churyumov-Gerasimenko; Martin Rubin, Kathrin Altwegg, Jean-Jacques Berthelier, Michael R. Combi, Johan De Keyser, Stephen A. Fuselier, Tamas I. Gombosi, Murthy S. Gudipati, Nora Hänni, Kristina A. Kipfer, Niels F. W. Ligterink, Daniel R. Müller, Yinsi Shou, and Susanne F. Wampfler; *Monthly Notices of the Royal Astronomical Society 526 (2023) 4209-4233.*
8. Experimental Investigation of the Photochemical Production of Hydrocarbons in Warm Gas Giant

Exoplanet Atmospheres; Benjamin Fleury, Yves Benilan, Olivia Venot, Bryana L. Henderson, Mark Swain, Murthy S. Gudipati; *The Astrophysical Journal 956 (2023) 135 (15 pp).*

9. Mass Spectrometric Fingerprints of Organic Compounds in Sulfate-Rich Ice Grains: Implications for Europa Clipper; Maryse Napoleoni,* Fabian Klenner, Lucía Hortal Sánchez, Nozair Khawaja, Jon K. Hillier, Murthy S. Gudipati, Kevin P. Hand, Sascha Kempf, and Frank Postberg; *ACS Earth Space Chem 7 (2023)1675.*

10. Thermal Behavior of Astrophysical Amorphous Molecular Ices; Murthy S. Gudipati, Benjamin Fleury, Robert Wagner, Bryana L. Henderson, Kathrin Altwegg, Martin Rubin; *Faraday Discuss., 245 (2023) 467-487*; DOI: 10.1039/D3FD00048F

11. High-fidelity reaction kinetic modeling of hot-Jupiter atmospheres incorporating thermal and UV photochemistry enhanced by metastable CO($a^3\Pi$); Jeehyun Yang, Murthy S. Gudipati, Bryana L. Henderson, and Benjamin Fleury; *The Astrophysical Journal 947 (2023)26.*

12. Science goals and new mission concepts for future exploration of Titan's atmosphere, geology and habitability: titan POlar scout/orbitEr and in situ lake lander and DrONe explorer (POSEIDON); Sébastien Rodriguez et al., *Experimental Astronomy* (2022) 54:911–973

13. Oxidant generation in the ice under electron irradiation: Simulation and application to Europa; Jiazheng Li, Murthy S. Gudipati, Yogeshwar N. Mishra, Mao-Chang Liang, Yuk L. Yung; *Icarus 373 (2022) 114760.*

14. Isotope Effect on the Sublimation Curves and Binding Energies of ^{12}CO and ^{13}CO Interstellar Ice Analogs; Lucas R. Smith, Murthy S. Gudipati, Rachel L. Smith, and Robert D. Lewis; *Astronomy and Astrophysics 626 (2021) A82.*

15. Disequilibrium Chemistry in Exoplanet Atmospheres observed with the Hubble Space Telescope; Gael M. Roudier, Mark R. Swain, Murthy S. Gudipati, Robert A. West, Raissa Estrela, Robert T. Zellem; *The Astronomical Journal 162(2021)27.*

16. Visible-light photoionization of aromatic molecules in water-ice: Organic chemistry across the universe with less energy; Antti Lignell, Laura I. Tenelanda-Osorio, Murthy S. Gudipati; *Chem. Phys. Lett. 778 (2021) 138814*.

17. Laboratory predictions for the night-side surface ice glow of Europa; Murthy S. Gudipati, Bryana L. Henderson, and Fred B. Bateman; *Nature Astronomy*, *5 (2021) 276*.

18. Influence of C/O Ratio on Hot Jupiter Atmospheric Chemistry; Benjamin Fleury, Murthy S. Gudipati, Bryana L. Henderson, and Mark Swain; *The Astrophysical Journal, 899 (2020) 147*; https://doi.org/10.3847/1538-4357/aba828

19. The Influence of Europa's Plumes on its atmosphere and ionosphere; Jiazheng Li, Murthy S. Gudipati, and Yuk L. Yung; *Icarus, 352 (2020) 113999;*

20. Europa's surface water ice crystallinity: Discrepancy between observations and thermophysical and particle flux modeling; Jodi R. Berdis, Murthy S. Gudipati, James R. Murphy, and Nancy J. Chanover, *Icarus 341 (2020) 113660*.

21. Photochemistry in hot H_2-dominated exoplanet atmospheres; Benjamin Fleury, Murthy S. Gudipati, Bryana L. Henderson, Mark Swain, *The Astrophysical Journal 871(2019)158, 14p; doi: 10.3847/1538-4357/aaf79f*

22. Photoreactivity of condensed acetylene on Titan aerosols analogues; Benjamin Fleury, Murthy S. Gudipati, Isabelle Couturier-Tamburelli, and Nathalie Carrasco, *Icarus 321(2019)358-366.*

23. Leeb hardness of salty Europa ice analogs exposed to high-energy electrons; Bryana L. Henderson, Murthy S. Gudipati, and Fred B. Bateman, *Icarus 322 (2019)114-120.*

24. Coulomb explosion of multiply ionized xenon in water ice; David v. Bekaert, Murthy S. Gudipati, Bryana Henderson, Bernard Marty, *Geochemical Journal 53 (2019) 69-81. doi: 10.2343/geochemj.2.0548*

25. Macromolecular organic compounds from deep hydrothermal sites on Enceladus; Frank Postberg et al., *Nature 558(2018)564–568.*

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